

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

5 In re application of: **TAUBER et. al**  
Parent Application Serial No.: **09/845,108**  
Parent Application Filed: **April 26, 2001**  
Attorney Docket No.: **CECOM 5520**

10 For: **RARE EARTH METAL COMPOUNDS FOR USE IN HIGH CRITICAL  
TEMPERATURE THIN FILM STRUCTURES FOR SUPER-CONDUCTORS,  
FERROELECTRICS, PYROELECTRICS, PIEZOELECTRICS, AND HYBRIDS**

Sir:

15 In accordance with Revised Amendment Format, these Remarks are submitted to support  
amending the above-identified application.

**REMARKS**

20 Claims 1-79 are now in the case. Claims 1-4, 6-7, 9-10, 12-13, 15-16, 18-19, 21-22, 24-  
25, 27-28, 30-31, 33-34, 36-37, 39-40, 42-43 and 45-49 are drawn to non-elected claims and  
have been withdrawn. Claims 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44 and 51-79, as  
amended, are drawn to dielectric substrates and buffer layers in a thin film structure. Claims 50-  
52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76 and 78 have been cancelled. No new claims  
have been added.

25 This is a divisional application of U.S. Patent Office Application Serial No. 09/845,108,  
entitled, "Rare Earth Metal Compounds For Use In High Critical Temperature Thin Film Super-  
Conductors, Ferroelectrics, Pyroelectrics, Piezoelectrics and Hybrids," which was designated as  
CECOM Docket No. 5469 and filed on April 26, 2001, hereinafter the "parent case." In the  
parent case (09/845,108), the Examiner issued a restriction requirement and following  
Applicants' election of claims to Invention Group I and several amendments, the Examiner  
30 issued a Notice of Allowance. The parent case (09/845,108) is currently pending before the U.S.  
Patent Office, and this co-pending divisional application is prosecuting a previously non-elected

claim from the parent case.

The parent case (09/845,108) was a continuation in part of U.S. Patent Office Application Serial No. 09/337,724, with the same title, filed on June 21, 1999, and designated as CECOM Docket No. 5433, which was a continuation in part of U.S. Patent Office Application Serial No. 08/717,822 with the same title, filed on September 24, 1996 and designated as CECOM Docket No. 5304. That application (Serial No. 08/717,822) was a continuation in part of U.S. Patent and Trademark Office Application Number 08/333,669 entitled, "Rare Earth Metal Containing Compounds and High Critical Temperature Thin Film Superconductors, Ferroelectrics, Pyroelectrics, Piezoelectrics, And Hybrids Including the Rare Earth Metal Containing Compounds," filed on November 3, 1994 and designated as CECOM Docket No. 5097, the "first application." It is respectfully submitted that the parent case (09/845,108) filed on April 26, 2001 by the inventors herein, is currently pending before the U.S. Patent Office and is therefore "an application similarly entitled to the benefit of the filing date of the first application," as mandated by 35 USC § 120 and 35 USC § 121, which is November 3, 1994. This divisional application's specification, as amended, claims priority from the November 3, 1994 effective filing date of the first application (08/333,669).

As required by the Revised Amendment Format, separate Amendments To The Claims, Amendments To The Specification and these Remarks are enclosed with this Amendment.

The Examiner from the parent case (09/845,108) required a restriction to one of five groups of inventions under 35 USC § 121. In response to that restriction requirement, Applicants elected Invention Group I, which were drawn to a rare earth compound. In the parent case (09/845,108), the Examiner issued a Notice of Allowance allowing amended claims 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40 and 43. In this Preliminary Amendment, Applicants seek to prosecute claims 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77 and 79 from Invention Group II which are drawn to a thin film structure of a plural metal oxide, classified by the United States Patent & Trademark Office in Class 428, subclass 697, comprising dielectric substrates and buffer layers constructed of thin films having the general formula  $Sr_2RESbO_6$  wherein RE is a designated rare earth metal such as Lutetium and with the formula  $Sr_2LuSbO_6$  and Lanthanum with the formula  $Sr_2LaSbO_6$ . This Preliminary

Amendment revises previously non-elected claims from Invention Group II in a manner consistent with the parent case's allowed claims and otherwise puts this divisional application in a condition for allowance.

In the parent case (09/845,108), the Examiner rejected the claims under 35 USC § 103 as being obvious over an article by Fesenko entitled "Synthesis and Study of  $A_2Sb_5O_6$  and  $A_3Sb_2S_5+B'O_9$ -type Ternary Oxides with Perovskite Structure," an article by Wittmann et al. entitled "On The Ordering Of  $B^{III}$  and  $M^V$  In Perovskites of the Type  $A_2^{II}B^{III}M^V O_6$ " and an article by Blasse entitled "New Compounds With Perovskite-Like Structures." After filing a Request For Continued Examination, claims 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40 and 43 were amended from objectionable dependent claims depending upon rejected base claims to independent claims for dielectric substrates. For example, claim 7 from the parent case (09/845,108) recited a dielectric substrate of the general formula  $Sr_2RESbO_6$ , further comprising the compound of  $Sr_2YbSbO_6$ , where the general formula included an  $Sb^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ , the dielectric substrate being heated for at least 20 hours at between  $1400^\circ \text{ C}$  and  $1600^\circ \text{ C}$  and being constructed in a bulk form, having a specific low dielectric constant and low dielectric loss and the dielectric substrate having an ordered perovskite cubic crystalline structure. It is respectfully submitted that reciting the crystalline structure of the parent case's dielectric substrates was a significant difference between them and cited prior art references supporting the allowability of those claims.

It is respectfully submitted that independent claims 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77 and 79, as amended, now recite either an ordered perovskite cubic or ordered perovskite pseudo-cubic tetragonal crystalline structure similar to the parent case's allowed claim 7, and the crystalline structures recited in allowed claims 7, 10, 13, 16, 19, 22, 25, 31, 34, 37, 40 and 43. For example, claim 8, as amended, now recites a dielectric substrate comprising  $Sr_2YbSbO_6$  in a thin film structure, the dielectric substrate being heated for at least 20 hours at between  $1400^\circ \text{ C}$  and  $1600^\circ \text{ C}$  and having a density GM/CC of 5.87, a low dielectric constant between 4.8 and 5.4 and a low dielectric loss less than  $1 \times 10^{-3}$  without a phase transition, the general formula including an  $Sb^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$  and the dielectric substrate having an ordered

perovskite pseudo-cubic tetragonal crystalline structure. Similarly, claim 53, as amended, now recites a buffer layer comprising  $\text{Sr}_2\text{YbSbO}_6$  in a thin film structure, the buffer layer being heated for at least 20 hours at between  $1400^\circ\text{C}$  and  $1600^\circ\text{C}$  and having a density GM/CC of 5.87, a low dielectric constant between 4.8 and 5.4 and a low dielectric loss less than  $1 \times 10^{-3}$  without a phase transition, the general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$  and the buffer layer having an ordered perovskite pseudo-cubic tetragonal crystalline structure.

It is respectfully submitted that the ordered perovskite cubic and ordered perovskite pseudo-cubic tetragonal crystalline structures are adequately supported by several specification passages. For example, specification page 3, lines 13-15, states:

Indexed powder diffractometer data taken using  $\text{CuK}\alpha$  radiation, reveals these compounds to be ordered perovskites. With the exceptions of  $\text{Sr}_2\text{LuSbO}_6$  and  $\text{Sr}_2\text{LaSbO}_6$  that are cubic, all of the other compounds are found to be pseudo-cubic, tetragonal.

(Emphasis Supplied)

Similarly, specification page 5, lines 12-16 further describes crystalline properties:

These compounds are distorted from cubic. They are indexed on the basis of a tetragonal unit cell with two exceptions,  $\text{Sr}_2\text{LuSbO}_6$  and  $\text{Sr}_2\text{LaSbO}_6$  that are cubic. See TABLE I. All these compounds form an ordered perovskite structure in which alternate B site ions are occupied by Sb and a rare earth ion. This gives rise to weak reflections in the X-Ray diffraction powder pattern that requires doubling of the unit cell. (Emphasis Supplied)

Based on these specification references, it is respectfully submitted that the specification adequately supports the dielectric substrates and buffer layers of the general formula  $\text{Sr}_2\text{RESbO}_6$  recited in amended claims 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77 and 79 having the ordered perovskite cubic and ordered perovskite pseudo-cubic tetragonal crystalline structures, which are neither taught nor suggested by the cited prior art references. Claims 5, 8, 11, 20, 26, 29, 53, 55, 61, 67 and 79, as amended, also correct informalities such as reciting incorrect GM/CC density figures, and these corrections are adequately supported by specification page 4, Table I.

The Amendments To The Specification relate to formal matters such as revising the title,

adding a statement claiming priority from the November 3, 1994 effective filing date of the first application, inserting "dielectric substrates and buffer layers in thin film structures" on specification page 2, lines 12-14 and correcting a few informalities, without adding any prohibited new matter.

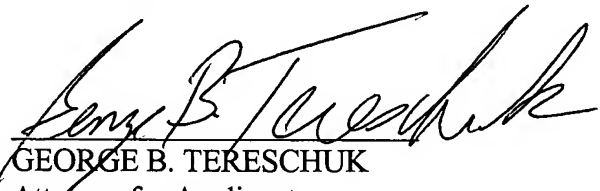
For these reasons, it is respectfully submitted that claims 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77 and 79, as amended, have been revised in a manner similar to allowed claims 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40 and 43 of the parent case (09/845,108). Therefore, it is respectfully requested that claims 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77 and 79, as amended, be allowed and pass to issue.

Should the Examiner require further information, the Examiner is invited to telephone the applicants' attorney at the telephone number listed below.

Respectfully Submitted,

12 March 2004

DATE

  
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